An attempt at the airline drinks puzzle

Luisa Li

June 2025

1 The most important bits

- A is C's husband, B is D's husband. A knows C's preferences in full and B knows D's preferences in full.
- The seat ordering is A, B, C, D, and passengers can observe all events that happen in front of them.
- The husbands A and B are **self-sacrificing**, if and only if it is reasonably believed that 1) **there is a chance** their actions will help their wives **and** there is 2) **no chance** their actions will hurt their wives. If either of the two conditions do not hold, the husbands act in self interest.
- All passengers have an unchanging preference throughout the rounds, and have no "tied" preference between any two drinks.

2 5 rounds of drinks

Round 1

Drink selection: 2 cups of coke, 2 cups of OJ.

A taking a coke → C prefers OJ over coke

Given there is two of each, C can be guaranteed her preferred drink of the two if A picks the drink that C does not prefer. By self sacrificing behavior, A will pick the drink that C does not prefer. Since A picked coke, we can conclude that C prefers OJ over coke.

B taking a coke → D prefers OJ over coke

B knows that C prefers OJ over coke, and will take one. That leaves one OJ and one coke for him and his wife to pick. B will pick the one that D does not prefer, so B taking a coke means that D prefers OJ over coke, also.

Round 2

Drink selection: 3 cups coke, 1 cup OJ.

A taking a coke gives no additional information

A has no information on B's preferences, so A picking coke has a chance of helping C get the OJ, which she prefers over coke. This does not give additional information to what we already knew.

B taking OJ → B prefers OJ over coke

B knows that C prefers OJ over coke, so although D prefers OJ over coke he knows that the OJ is not making it to her. So B can act in self interest and pick what he prefers out of OJ and coke.

Round 3

Drink selection: 1 cup coke, 1 cup OJ, 2 cups water.

A taking an OJ → C prefers water over OJ over coke, and A prefers OJ over coke

A knows that C prefers OJ over coke, and still has no knowledge of B's preferences. So he would not pick OJ if C preferred OJ over water, as that kills the slight chance that C would get OJ. Therefore C must prefer water over OJ over coke.

Knowing C's full preferences, we see that C will get her top pick for beverage regardless of what A picks between OJ and coke. So A's choice of OJ also speaks to his personal preferences - he prefers OJ over coke, also.

B taking a coke → D prefers water over coke

B knows the full set of information that we know up until now, given that C and D have had no choices thus far, and he can see A's choice. B thus knows C's full set of preferences and knows that she prefers water over coke. This leaves a water and a coke for B and D, and B must again pick the option that his wife prefers less. So B taking a coke means that D also prefers water over coke.

Round 4

Drink selection: 3 cups OJ, 1 cup water.

A taking an OJ gives no information

A still doesn't know anything. Picking OJ gives a remote chance that his wife C will get water.

B taking a water → B prefers water over OJ

B knows that C prefers water over OJ, and that the water would not make it to D regardless of what he picks. So he is free to pick between water and OJ, and his choice of water reveals that he also prefers water over OJ.

Round 5

Drink selection: 1 cup OJ, 3 cup water.

A taking an water → A prefers water over OJ

C loves drinking water and but be guaranteed a cup regardless of what A picks. A picks water tells us that he prefers water over OJ.

B taking an OJ → D prefers water over OJ

B knows that C prefers water over OJ and will take a cup. This leaves a cup of water and a cup of OJ for him and his wife. B must again pick what D does not prefer of the two, so B taking an OJ means that D prefers water over OJ.

3 Conclusion

Compiling all known information, we obtain the full set of preferences, which is that all passengers prefer water over OJ over coke.